VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY STANDARDS
OFFICE OF WATER QUALITY PROGRAMS
2001 FISH TISSUE AND SEDIMENT MONITORING PLAN

March 19, 2001

Introduction

The Virginia Department of Environmental Quality (DEQ), Water Quality Standards Unit (WQS) is responsible for the design and execution of the Fish Tissue and Sediment Monitoring Program. This document provides information concerning the proposed stations for monitoring fish tissue and sediment during 2001 and the rationale for the station selection.

Objective

The objective of the Fish Tissue and Sediment Monitoring Program is to systematically assess and evaluate, using a multi-tier screening, water-bodies of Virginia in order to identify toxic contaminant accumulation adversely affecting human users of the resource and the total biological community. Data collected will be used to quantify human health risks and ecological/environmental health conditions. In addition, follow-up studies are conducted when problems are found and/or when recommended by the Virginia Department of Health (VDH) via a memorandum of understanding between VDH and DEQ. VDH uses data generated by this program to assess the need for issuing or modifying fish consumption advisories

Sampling Design

The water-bodies of Virginia are separated into fourteen river basins or sub-basins. In the past, the fish tissue and sediment were sampled in all fourteen of the river basins within a five-year cycle following procedures stated in the DEQ Quality Assurance/Quality Control Project Plan for the Fish Tissue and Sediment Monitoring Program. In April 2000, the General Assembly amended section 62.1-44.19:5 of the code of Virginia and instructed the DEQ to sample all of the river basins within a three-year rotational cycle contingent upon available funding. Three river basins have been selected for the 2001-sampling season: the James, Rappahannock, and Potomac/Shenandoah River Basins.

At the time staff developed this monitoring plan the total amount of funding available for 2001 calendar-year sample-season was uncertain since the State General Assembly was still in session and the agency budget was not finalized. If additional funding necessary for the three-year rotation is not available, the program will convert to the five-year rotational cycle and staff will only sample the James and Rappahannock River Basins.

A total of 91 proposed fish tissue and/or sediment sampling stations have been selected within the basins. Sites within each basin are ranked from 1 to 3 with 1 being the highest priority and 3 the lowest priority. The rank is based on known or potential water quality problems at the sample location, special requests by the VDH or citizen groups, and/or if the sample location is a relatively intensive resource for recreational or commercial fishing. Priority will be given to sites with the highest rank if funding will not allow all sites to be sampled. Extensive effort will be made to complete all of the stations finally selected, but if equipment problems and/or severe weather impact(s) the sampling schedule, priority will be given to stations where water quality problems have been historically documented.

Most of the sample sites are freshwater; however, several are brackish or saltwater locations.
The samples that will be collected at each freshwater station include, one sediment sample and three to five tissue composite samples (5-10 individuals per composite) consisting of fish species that are typically consumed by humans. Samples will include at least one bottom feeder (e.g. catfish sp.), which may be highly exposed to contaminated sediments compared to other species, and two to four top trophic level feeders (e.g. bass and blue gill sp.), which may be exposed to contaminants via biomagnification. Collection of targeted species for tissue analysis at the brackish and saltwater sites may be problematic since only 10-15% of the fish and shellfish species at the stations are year-round residents and few of the resident species are typically consumed by humans (Murdy et. al. 1997). It is likely that sample collection techniques will yield several species of migratory fish and shellfish that are consumed by humans and a few resident fish species that are not consumed by humans. Contaminants found in migratory fishes may not reflect local pollution problems but may be used to calculate human health risks from consumption.

Contaminants found in sediment and resident fishes may be used to identify local inputs of bioaccumulative contaminants. Therefore, the samples that will be collected at each brackish or saltwater station include one sediment sample and three to five composite samples (5-10 individuals per composite) consisting of an edible migratory, an edible or non-edible resident, and an edible or non-edible bottom species. The entire data set should help determine if any unacceptable human health risks are associated with fish consumption, and if local inputs of bioaccumulative contaminants are in tissue and/or sediment at levels of concern. For a detailed list of species that will be targeted at each brackish or saltwater station see Table 1. All samples collected by the Fish Tissue and Sediment Monitoring Program will be analyzed for metal and organic contaminants by the College of William and Mary/Virginia Institute of Marine Science.

Station Selection Criteria

The stations in each basin have been selected to produce site specific conclusions and provide spatial coverage of the entire basin. The following criteria were used to select the 2001 sampling stations:

1) Historical Data Review

2) Spatial Distribution

3) Specific Water Quality Problems

4) Major Tributary Status

5) External Request from other VADEQ offices, State Agencies, or citizen groups

6) Point Source

7) Nonpoint Source

8) Major Fishery

The attached references were used in selecting the sampling stations. The station number, priority rank, river mile, latitude, longitude, criteria for selection, and corresponding USGS topographical survey map name for each proposed sampling station are provided (see table 2). Summary maps showing the location of all of the proposed sample stations are attached (see figure. 1-3).

Sample Collection and Reporting

Fish tissue and sediment samples will be collected in the early spring through late fall, 2001. Data for all of the samples should be received from the laboratory by June 2002. The data will be tabulated as it is received and sent to VDH per an October 2000 Memorandum of Agreement between the VDH and DEQ. VDH will make an evaluation regarding potential human health impacts due to contaminated fish consumption and issue a fish consumption advisories or bans as needed.

The tabulated data will also be sent to the water quality/monitoring managers at the impacted DEQ Regional Office(s) and sent to the DEQ webmaster for posting on the DEQ web site at:
http://www.deq.state.va.us/fishtissue/

Table 1. Target species at each of the brackish water or saltwater stations.

Migratory Fish (Normally consumed by humans)	Resident Fish (Some may not be consumed by humans)	Benthic Fish/Shellfish (Some may not be consumed by humans)
Striped Bass	White Perch	Oyster spp.
Spot	Yellow Perch	Clam spp.
Atlantic Croaker	Killifish, Banded	Blue Crab
Weak Fish	Killifish, Striped	Summer Flounder
Black Sea Bass	Killifish,Rainwater	Smallmouth Flounder
Spotted Seatrout	Killifish, Marsh	Oyster Toadfish
Black Drum	Killifish, Spotfin	Hogchoker
Red Drum	Mummichogs	Tongue Fish
Silver Perch	Sheepshead Minnow	Channel Catfish
Northern Kingfish	Silverside, Inland	White Catfish
Southern Kingfish	Silverside, Rough	
Gulf Kingfish	Silverside, Atlantic	
Bluefish	Bay Anchovy	
	Gizzard Shad	

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